Institute of Molecular and Cell Biology

A*STAR

SEMINAR ANNOUNCEMENT

We would like to invite you to attend this seminar hosted by A/Prof. Frederic Bard:

Date: 12 February 2018, Monday

Time: 11:00AM – 12:00PM

Venue: Level 3, IMCB Seminar Room 3-46, Proteos, Biopolis

Speaker: Prof. Henrik Clausen, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark

Title: A Genetic Dissection Approach to Functional Glycomics

Glycosylation is one of the most abundant and diverse posttranslational modifications of proteins, but arguably also one of the most difficult to study with respect to occurrence, structure, and biological functions. Heterogeneity in occupancy and structures of glycans on proteins is the major obstacle for analytic strategies, and this is also the major obstacle for exploiting biological functions of glycans in biotechnology. We have therefore taken genetic deconstruction & reconstruction approaches to dissect the glycosylation and modification processes of proteins and proteoglycans. We use rational combinatorial knockout/in of relevant genes with precise gene editing tools (DNA nuclease “scissors” ZFNs and CRISPR/Cas9) to simplify, dissect, and design glycosylation more or less at will. The strategy has led to increased knowledge of different glycoproteomes as well as discovery of new types of protein glycosylation. Genetic dissection of glycosylation in isogenic cells enables exploration of biological functions and dissection of molecular mechanisms of disease. Moreover, libraries of engineered isogenic cells may be used to develop cell-based glycan arrays for interrogation of interactions with glycans. We will present illustrative examples of the power of gene editing in the glycosylation field that is rapidly turning into “Lego-Toying”.

Biography:

DDS (1981) and DSc (1990). Worked in the glycobiology field for 30+ years focusing on structure, biosynthesis and genetic regulation of complex carbohydrates. Studied with professor Sen-Itiroh Hakomori in Seattle (1983-90) on blood group related carbohydrates, glycosyltransferases and genes. Founded a glycobiology research group at the Faculty of Health and Medical Sciences, University of Copenhagen, Denmark, in 1990, and since 2007 head of a Center of Excellence in Glycomics funded by University of Copenhagen and since 2012 the Danish National Research Foundation. Past member of scientific advisory boards and consultant for Neose Technologies and ZymeQuest. National representative for International Glycoconjugate Organization (IGO) and member of the Royal Royal Danish Academy of Sciences and Letters. Research focus is primarily protein glycosylation, where we have isolated, cloned, and expressed many of the human glycosyltransferases involved in the biosynthesis. Our interests are broad and include basic understanding of genetic regulation, and biosynthesis of protein glycosylation, Immunity to glycans and glycoproteins, consequences of deficiencies in glycosylation in diseases, and biomedical applications. We have developed strategies to isolate and characterize O-glycoproteomes of cells by use of nuclease-mediated gene engineering and a combination of lectin chromatography and mass spectrometry (SimpleCells). Applied broad genetic glycoengineering of mammalian

cells for deconstruction of glycosylation capacities and design of optimal platform cells for recombinant therapeutics. We have further developed glycopeptide arrays with comprehensive chemoenzymatic synthesis of glycopeptides, and we are now developing cell-based glycan arrays.

ALL ARE WELCOME *(No registration required)*